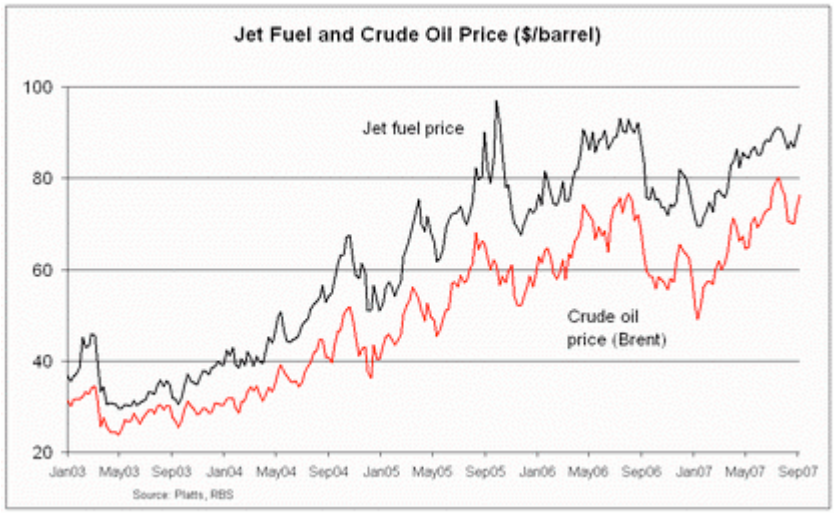
Danielle Wood
ESD.71 Uncertainty Assignment

Potential Causes for Decrease in Emplanements at Boston Logan Airport between 1999 and 2004

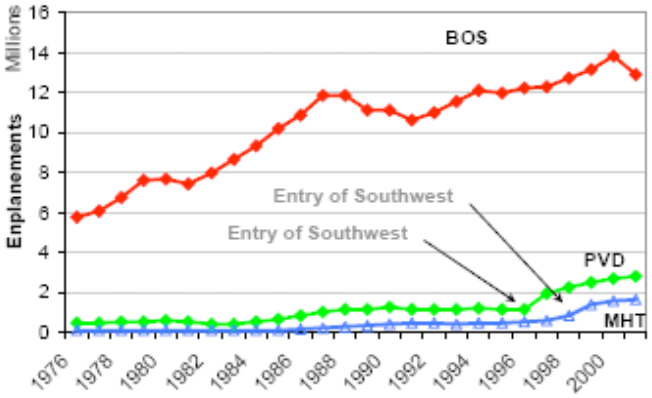
There are several economic, technical, political, regulatory and industrial factors that could help explain the decrease in emplanements observed at Boston's Logan Airport between 1999 and 2004. Many of the factors straddle several of these categories and many of them seem to be interlinked. Perhaps the keystone event that affected airports worldwide during this period was Sept 11th, 2001. A few of the factors that will be discussed below had their roots in the terrorist attacks of 9/11. Another major thematic element that connected several factors seemed to be the challenges faced by the US's legacy airlines in maintaining their business. These two strong themes are pointers to the clues that unravel this mystery.

The events of Sept 11, 2001 led to economic, regulatory and societal changes with respect to the airline industry. After the attacks, there was a general fear of flying that caused some people to choose alternative means of transport. This is discussed in an article by Arlene Fleming.[i] In addition there were regulatory changes that made flying more inconvenient. The Aviation and Transportation Security Act of 2002[ii] created the Transportation Security Administration. This led to many restrictions and added security measures for passengers. This inconvenience could be a factor that reduced emplanements. Also, we note that jet fuel prices have been increasing and causing an increase in plane ticket prices. The graphic below[iii] shows the trend of fuel prices. The upward climb is at least partly related to the unsettled conflicts of the Middle East that were exacerbated by the aftermath of Sept 11th and the invasion of Iraq. Thus, we conclude that Sept 11th, spurred several negative factors that worked to decrease emplanements at airports like Logan.



The next major theme to explore is the legacy carriers' struggle to maintain their business. Even before Sept 11th, 2001, there were signs that airlines like Delta, Northwest and United were not doing well. United was under bankruptcy protection between 2002 and 2004[iv]. One article notes that a down turn in airline profits started 8 months before 9/11/01. This same article[v] discusses the filing of Delta and Northwest for bankruptcy protection in 2005. Although 2005 is outside of the time period we considered, the seeds that led to the 2005 decisions were clearly at work between 1999 and 2004. One of those

seeds was competition between the legacy (hub and spoke) airlines and new low cost carriers, according to a paper by Markus Franke in the Journal of Air Transport Management.[vi] These airlines such as Southwest and Jet Blue had an effect on Logan. The thesis[vii] by Phillippe Bonnefoy of MIT's ICAT from 2005 shows how the airports at Providence and Manchester benefited from the entrance of Southwest between 1996 and 1999. The expansion of Southwest's services could have been part of the problem for Logan. Finally we note that as part of the shift for legacy carriers, there was an increase in the use of regional jets. Another paper from MIT ICAT by Mozdznowska[viii] shows how these jets increased in use between 1998 and 2003. The author mentions that they can compete with traditional jets for operations.



1: Source, Thesis of Bonnefoy, P. MIT, 2005.

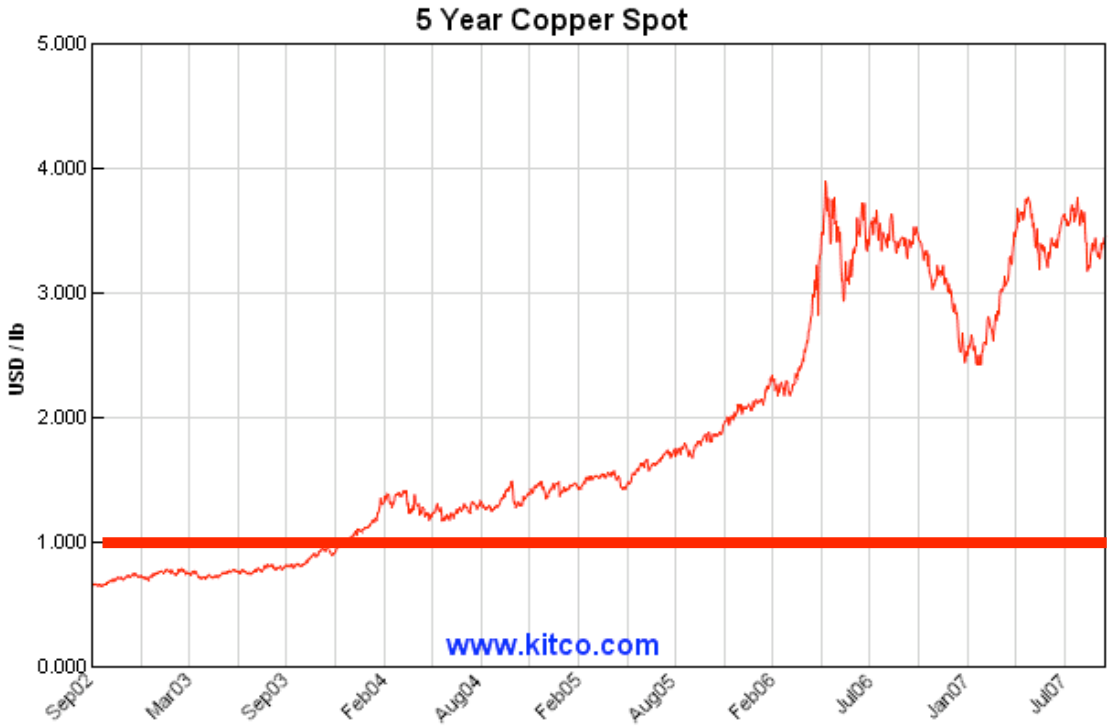
Danielle Wood
ESD.71 Uncertainty Exercise
Turned in on September 18, 2007

To: CopperBoss
From: Danielle Wood, Analyst
Date: September 18, 2007
Re: Future Copper Pricing

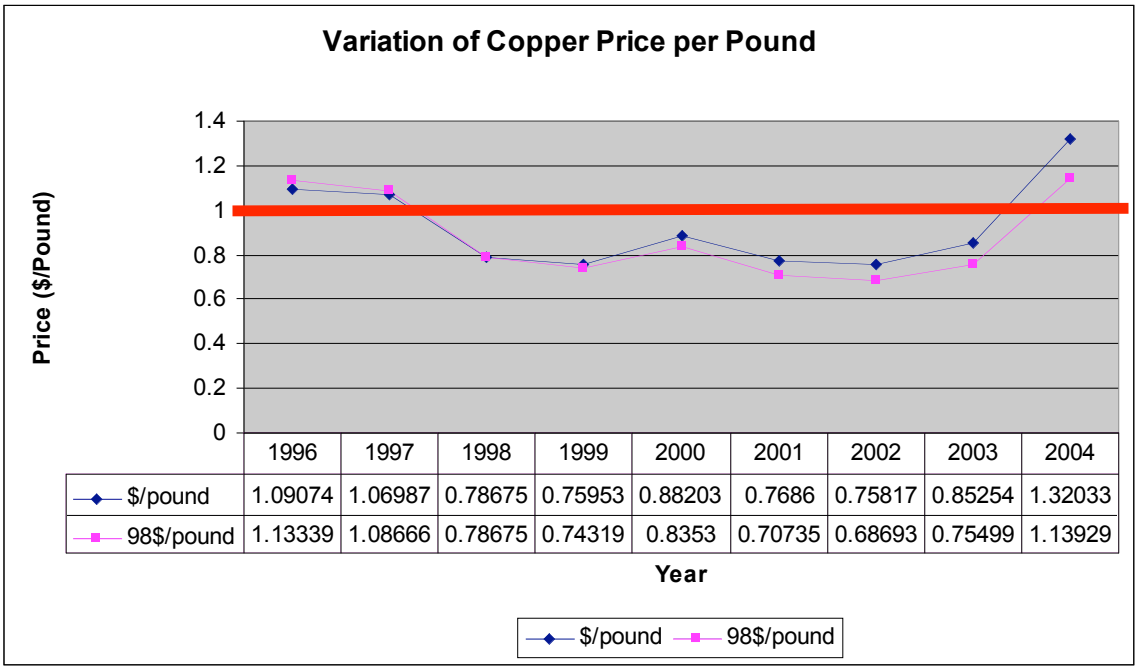
It has come to my attention that our company's policy is to use a constant and rather low expected price of copper when doing proposed future designs. The current price that is mandated by company policy is $1 per pound of copper. This policy is a grave error because it leads to poor economic analysis on proposed future strategy design. As a result, our company is missing potentially beneficial strategies because we evaluate all proposed designs based on a constant price of $1 per pound of copper. We should instead use a Gaussian distribution with mean and variance based on historical data for the price of copper in order to understand the range of possible future scenarios for which we want to prepare.

Although the price of copper did stay near or below $1 per pound between 1996 and 2003, we have seen a dramatic increase in the price since 2004. The attached graphics show the historical price variation. It is clear from this visual that our assumption that the price is a constant $1 is very inaccurate.

A brief review of copper market trends is convincing proof that the price of copper will most likely not be constant in the future. We have seen volatility in the price due to the rise and fall of the use of substitute metals. Aluminum, titanium, steel, optical fiber and plastics can all be used as substitutes for copper in various applications[ix]. For electrical needs, aluminum is the likely candidate. For telecommunications needs, the use of optical fiber is increasing as more homes are receiving this service. The price of copper is also affected by shifts in industry structure due to plant consolidation. The US is one of the largest producers and consumers of copper; thus the state of the US economy affects our price as well. In particular, the state of the construction industry drives the copper price. We should also note that the health of the Chilean and Zambian economies and governments affect the copper price because of those country's high production levels[i,x]. If there are changes in these factors, our $1/pound predictions will be off and we could loose money due to unwise investments. As we consider all the variables that could change the copper price, it becomes clear that we need designs that prepare us for the many possibilities ahead. Using a Gaussian distribution based on historical data to model the price of copper is a prudent way to generate a broad range of possible futures.



2: This Shows Price of Copper per pound between Sept 02 and July 07. Source: Kitco Base Metals.[xi]



	1996	1997	1998	1999	2000	2001	2002	2003	2004
$/pound	1.09074	1.06987	0.78675	0.75953	0.88203	0.7686	0.75817	0.85254	1.32033
98$/pound	1.13339	1.08666	0.78675	0.74319	0.8353	0.70735	0.68693	0.75499	1.13929

3: This figure shows the variation in copper price between 1996 and 2004. Note that one curve shows nominal values and the other shows values in 98 value dollars. Source: US Geological Survey[xii]

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References

[i] http://airtravel.about.com/cs/remembering911/a/AirlineLosses.htm "Airline Losses After September 11th." Accessed September 18, 2007.

[ii] Aviation and Transportation Security Act. http://thomas.loc.gov/cgi-bin/bdquery/z?d107:SN144. Accessed September 18, 2007.

[iii] ATA. http://www.iata.org/whatwedo/economics/fuel_monitor/price_development.htm. Accessed September 18, 2007.

[iv] http://www.usatoday.com/travel/flights/2006-02-01-united-timeline_x.htm. Accessed Sept 18, 2007.

[v] "Delta, Northwest File for Bankruptcy". http://money.cnn.com/2005/09/14/news/fortune500/bankruptcy_airlines/index.htm Accessed Sept 18, 2007.

[vi] Franke, Markus. "Competition between network carriers and low-cost carriers – retreat battle or breakthrough to a new level of efficiency". Journal of Air Transport Management. Vol 10, Issue 1. Jan 2004. pp 15-21. Proceedings of Hamburg Aviation Conference, 2003.

[vii] Bonnefoy, P., Hansman, J., "Emergence of Secondary Airports and Dynamics of Regional Airport Systems in the US". ICAT, May 2005. http://hdl.handle.net/1721.1/34908 Accessed September 16, 2007.

[viii] Mozdznowska, A., Hansman, J., "Evaluation of Regional Jet Operating Patterns in the Continental United States" May 2004. ICAT-2004-1. http://hdl.handle.net/1721.1/34957 Accessed September 16, 2007.

[ix] Copper Industry Yearbook, 2001-2002. Global Insight Inc. Waltham, MA. http://search.ebscohost.com/login.aspx?direct Accessed September 16, 2007.

[x] Economy of Zambia. http://en.wikipedia.org/wiki/Economy_of_Zambia#Copper Accessed September 16, 2007.

[xi] Kitco Base Metals. http://www.kitcometals.com/charts/copper_historical_large.html Accessed September 17, 2007.

[xii] http://minerals.usgs.gov/ds/2005/140/#data USGS Data Series 140. Thomas D. Kelly and Grecia R. Matos, with major contributions provided by David A. Buckingham, Carl A. DiFrancesco, Kenneth E. Porter, and USGS mineral commodity specialists. Accessed September 17, 2007.

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